



**Health Service Enterprise (HSE)  
Vermont Enterprise Architecture Framework (VEAF)  
Health Services Enterprise Platform (HSEP)  
Overview and Strategies**

Department of Innovation and Information  
State of Vermont

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## Vermont's Health Service Enterprise (HSE) Strategy

### Overview

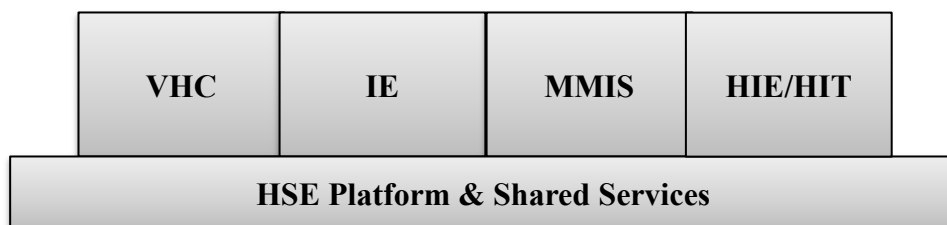
The State of Vermont's (SoV) HSE vision is a multi-year, multi-phased approach that reshapes and integrates our current/future business processes, improves our public/private sector partnerships, enhances our utilization of information, modernizes our IT environment, and results in an end-to-end transformation of the Health Care and Human Services experience for the Vermont populace as well as the State and private employees who support the HSE.

Vermont's aggressive agenda for change is built on providing Vermonters with improved access to their personal health data in a secure, timely and effective manner, enabling services and solutions resulting in enhanced access to health care benefits, better health outcomes, and improved life situations. The HSE strategy is to invest in new and upgraded capabilities, components and technology that serve the current and near-term needs, while being positioned to help the State continually evolve to an integrated Enterprise in the strategic timeframe. At the same time, these capabilities will help the State transition to support Vermont's envisioned health care system. As such, the HSE represents a holistic approach to innovation in Vermont's health care ecosystem.

The HSE is the comprehensive collection of business, technology and governance strategies defined utilizing the Vermont Enterprise Architecture Framework (VEAF). The HSE consists of a Governance structure, the Health Service Enterprise Platform (HSEP), the Vermont Health Connect (VHC) online health insurance exchange, the Integrated Eligibility & Enrollment (E&E) system, the Medicaid Management Information System (MMIS), and Clinical Public Health Information Integration technologies (Health Information Exchange – HIE).

These HSE strategic initiatives/projects are being incrementally deployed, utilizing the HSEP's new service-oriented architecture (SOA) allowing for modular, flexible, interoperable shared services, common technology, and detailed information. The new environment is designed consistent with the Centers for Medicare & Medicaid Services' (CMS') Medicaid Information Technology Architecture (MITA) and Seven Standards & Conditions to ensure the State's ability to meet the goals of increasing electronic commerce and transition to a digital enterprise.

As depicted in [Figure 1 HSE Business Initiatives](#), the Vermont HSE is a combination of business initiatives/projects, using the HSE Platform (HSEP) as a foundation for base business capabilities and as an integration hub for shared services. The HSEP provides the infrastructure, services and functional components that each solution shares.



[Figure 1 HSE Business Initiatives](#)

This integrated investment in functional solutions and a standard computing platform are the key enablers for the State of Vermont to adopt an Enterprise approach and achieve true innovation in health care for the general population. Another important view of these solutions and platform reflects their respective deployment and relative maturity. This innovation began in Vermont with Vermont Health Connect and initial HSEP and continues with the investment in remaining capabilities. As common business services emerge, there will be greater reuse downstream. This will allow for downstream solutions to be less costly as greater reusability is in place.

The State of Vermont Enterprise Architecture Framework (VEAF) drives the sharing and leveraging of capabilities, business processes, components, system features, and functionality across the state and has a dramatic effect on sustainability for the HSE strategy. The phased nature of the HSE effort means the business capabilities and subsequent technology will continue to mature over time requiring an ongoing Enterprise Architecture effort.

The State's vision is to provide a more "person-centric" view of its 700,000 citizens. This is augmented by the HSE strategy of the Agency of Human Services' (AHS) being seen as an "Agency of One". Our "Agency of One" principle focuses on securely sharing any and all applicable data in a timely and effective manner to ensure Vermonters:

- Receive all of the services they not only recognize as critical to ensuring their success but also identify additional supports that will help them prosper
- Receive cross-departmental referrals and awareness – "no wrong door" for Vermonters
- Policy and Public Health efforts have necessary data for program analysis and program service coordination

The HSE is creating an environment where the person is the focal point, not the program. The cost to the State is offset by savings from an improved delivery model and Vermont has already seen some

early results, based on the early years of Health Information Exchange implementation, with data indicating fewer hospital readmissions and fewer emergency room visits.

The “Totality” of these systems makes up the core pieces of the Enterprise. Each will appropriately share information (demographics, financials, benefits, etc.) to improve efficiencies in not only the services and benefits an individual receives but creates a ‘golden record’ of an individual. This ‘golden record’ will allow the Agency to meet its ‘Agency of One’ goal of making a difference in the lives of Vermonters through program effectiveness, integration, focus on outcomes and alignment of processes across the Agency and will maximize value out of every tax dollar; by measuring outcomes; and moving from individual program delivery to integrated service delivery.

The Health Services Enterprise is divided into five major focus areas:

1. Health Services Enterprise Platform (HSEP) – the core shared infrastructure delivering shared and reusable technical and business capabilities
2. Vermont Health Connect (VHC) – Vermont’s Health Insurance Exchange (HIX)
3. Integrated Eligibility (IE) - Eligibility & Enrollment systems
4. Medicaid Management Information System (MMIS) – claims processing, pharmacy, program integrity
5. State Medicaid HIT Plan (SMHP) - Clinical Information Systems, including the Health Information Exchange (HIE)

## Vermont Enterprise Architecture Framework (VEAF) Strategy Overview

The State of Vermont recognizes that the development of Enterprise Architecture is a long term, on-going process critical to the success of creating sustainable, integrated solutions that remain agile for ever-changing business needs. The continued move to distributed cloud-sourced solutions, service-oriented architectures and cloud-sourced management require a tremendous amount of coordination and formal processes. As institutional knowledge is no longer buried in the minds of staff, the need to articulate and maintain strategy, current/future state business processes, application configurations, information models and detailed technology views in a standard fashion to operational vendors, system integrators and business leaders is imperative. The approach taken by the State of Vermont describes architecture as an adaptable and evolving process providing continuous alignment between the business of state government and technology. Enterprise Architecture, as a practice within the State of Vermont, understands a clear trail of evidence from business capabilities and processes to IT management principles.

The Enterprise Architecture functions with a view to adaptability and sustainability of solutions by engaging with business leaders within the State, and offering high level technical expertise as to the VEAF Level 0

suitability of a Business Domain's functionality within the EA. Working hand in hand with business leaders, subject matter experts and project teams, Enterprise Architects help articulate business strategy and map these capabilities to all other architectural domains.

The following key architecture domains drive the VEAf program (Figure 2 VEAf Domains): Business, Application, Information, and Technology. These domains are managed by Governance and the Enterprise Architecture Strategy.

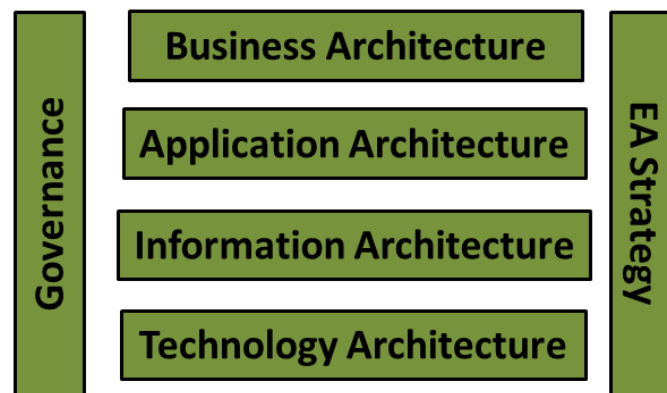


Figure 2 VEAf Domains

The framework of EA provides a “generic problem space and common vocabulary within which individuals can cooperate to solve a specific business problem.” The State of Vermont Enterprise Architecture Framework (VEAF) is based on the best of industry standards such as (TOGAF and OEAF). Some key benefits are listed below.

- Provides an enterprise-wide vision that is driven by business objectives and aligned to technology strategies.
- It implements best practices and principles resulting in efficient, rapid responses to emerging business needs.
- It reduces expenditures by lower development, support and maintenance costs.
- Creates reusable pattern of architecture which minimize costs.
- Provides an Enterprise Architecture with a clear strategy for procurement and migration. (RFP, Contract review)
- Enables a consistent framework providing for better return on existing investment and supports future technology decisions.

The Enterprise Architecture Program consists of an EA framework (VEAF) delivered through Enterprise Architecture, SOA, and Cloud Hosting “Centers of Excellence”; These Centers of Excellence provide principles, standards, business capability strategies, and processes that help to ensure the Enterprise business vision can be realized. It is through the VEAF framework that business and technology vision and strategies align and mature.

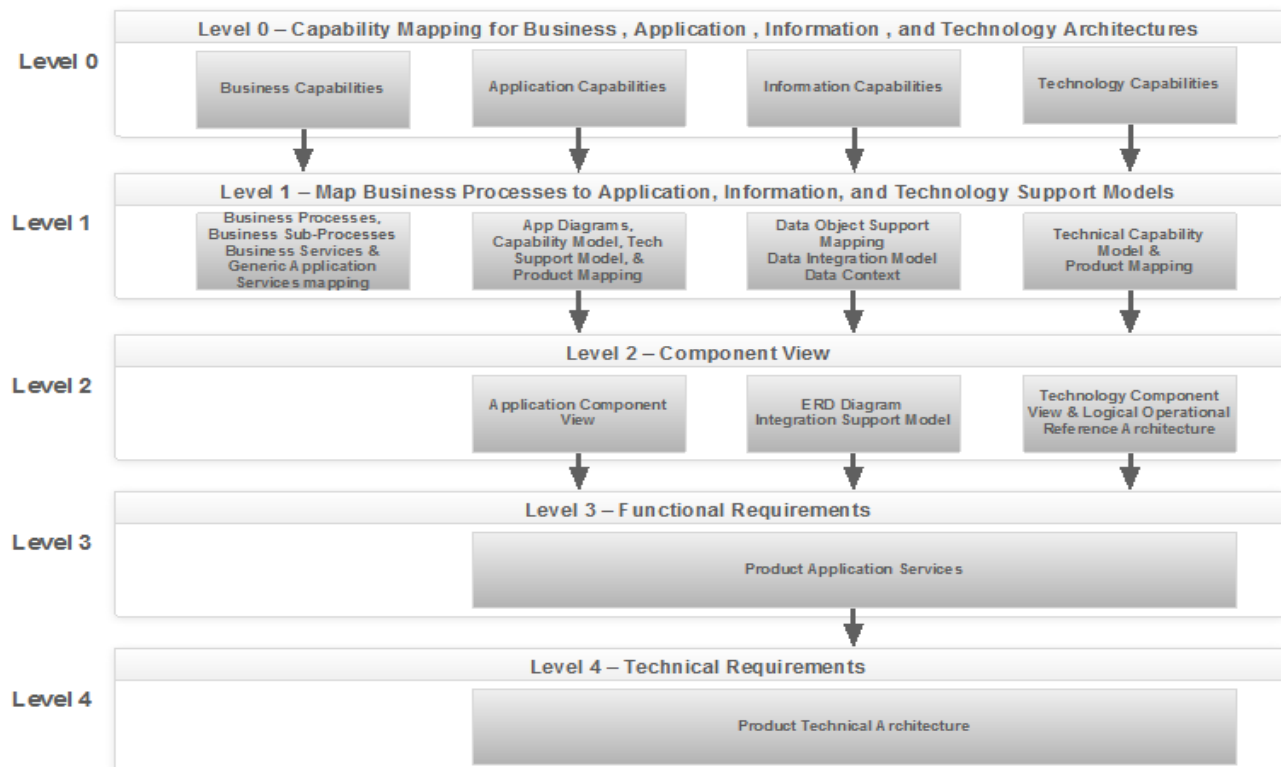


Figure 3 Artifact Levels of Complexity

The VEAF framework focuses on four main architecture domains: Business, Application, Information, and finally Technical. Within each of these domains there are specific artifacts, processes that map/link via levels of complexity (Level 0 – 4) the intersection of all domains. Figure 3 Artifact Levels of Complexity. The Business Architecture includes business process models, business capabilities and requirements produced and maintained by business analysts under the Business Architecture domain of the EA program. Enterprise Architects utilize these deliverables to map these business capabilities and processes first to the Application Architecture, then the Information Architecture and finally to the Technical Architecture.

The VEAF program consists of numerous tasks and deliverables across the entire enterprise life cycle including business case rationalization, request for proposal, contracting, project alignment and execution, implementation, transitioning operations and maintenance.

It cannot be stressed enough that it is the Enterprise Architecture program not the “Technology” that drives reuse, limits redundant or conflicting technologies and enhances business capabilities - while

remaining agile and sustainable. In order for the HSE vision to be successful it takes a proven enterprise industry approach.

Figure 4 Enterprise Architecture Value Add diagram below highlights some of the key stages, efforts and deliverables within stages that are the focus of Enterprise Architects through project life cycles, future state planning and steady state operations. This is not an exhaustive list.

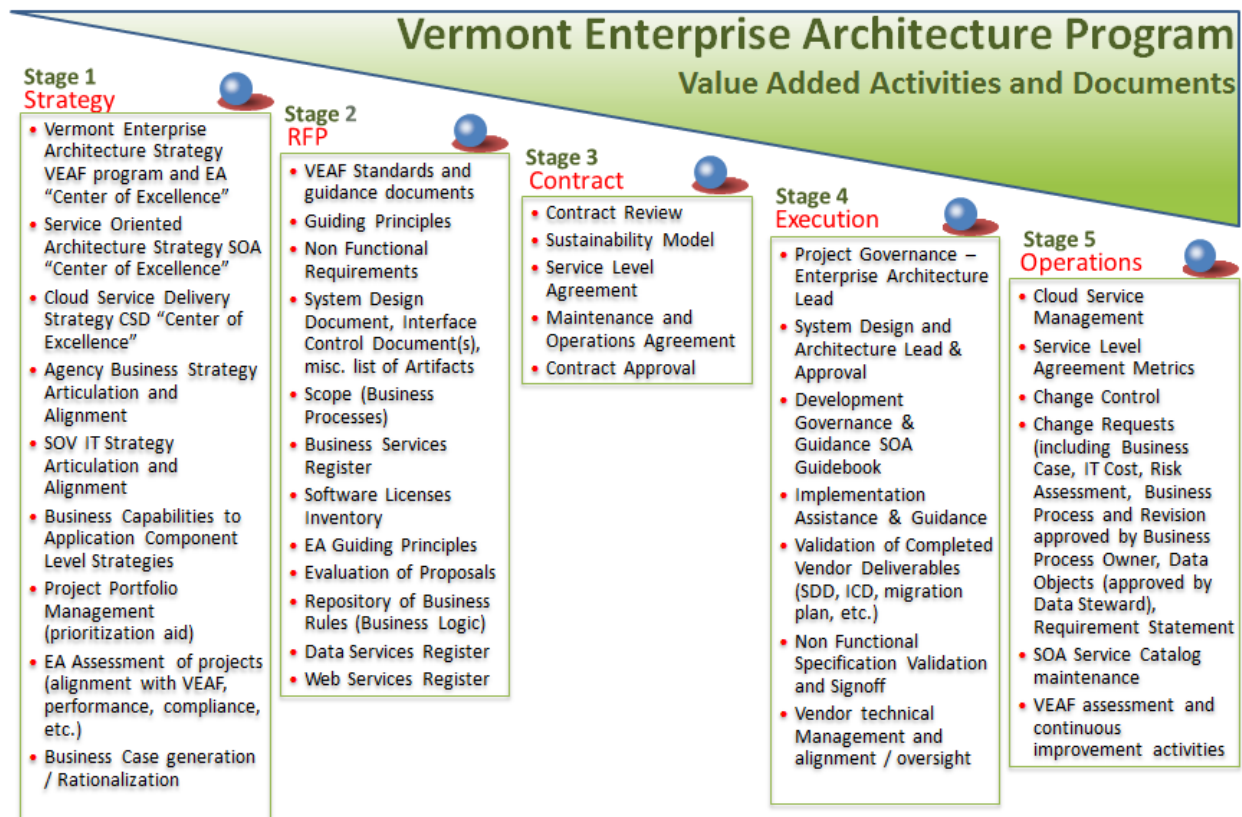


Figure 4 Enterprise Architecture Value Add



## Vermont's Health Services Enterprise Platform (HSEP) Strategy Overview

In order to realize the HSE vision, the HSEP is being delivered through the State of Vermont Enterprise Architecture program as mentioned above. By aligning HSE business strategy and business capabilities and State of Vermont IT strategy we are able to leverage numerous perspectives, technologies and truly target citizens across the State and Agency Enterprise. As the required business capabilities include numerous communication channels, citizen self-service and integrated case management it becomes clear that technologies, business delivery and operations require many transformational activities to be successful. The anticipated and targeted business capabilities required by the Health Service Enterprise are depicted in Figure 5 below.

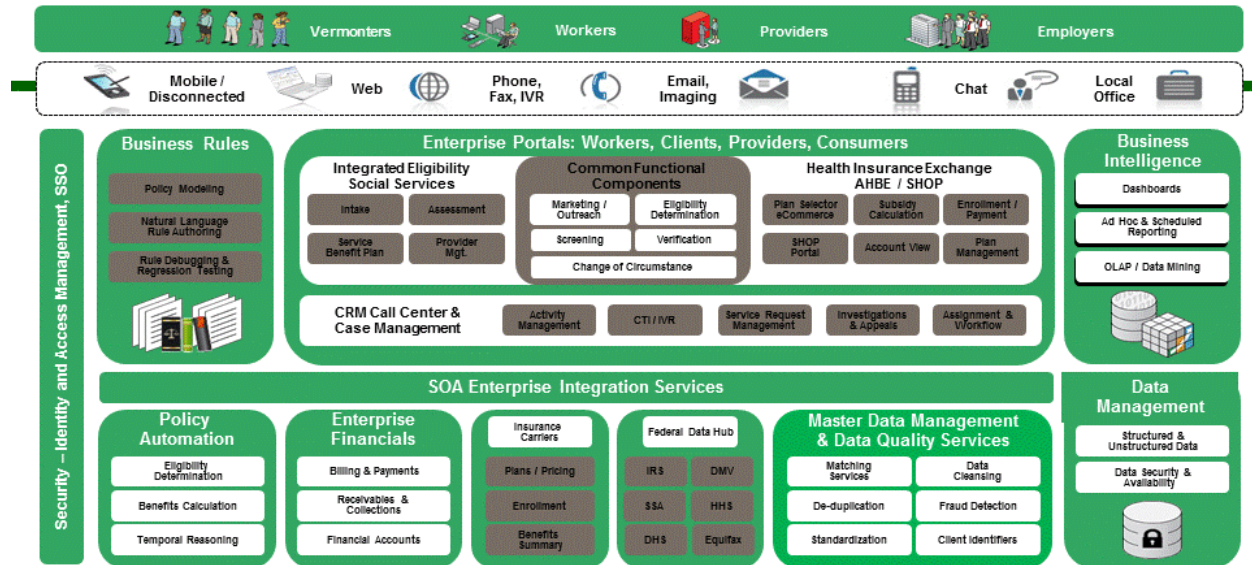


Figure 5 Vermont Enterprise Architecture Platform

The benefits of implementing the “new” platform will be shared services across all HSE initiatives. All future Agency of Human Services projects will have the advantage of having integrated case management, Identity and Access Management, Portal, MDM, ECM, reporting, rules engine, database, and SOA infrastructure primarily in cloud sourced environment(s) managed by service delivery vendor(s) to facilitate financial sustainability of the solutions.

The HSEP environments that contain requirements for high availability, run-time performance, disaster recovery, security and general maintenance and operations are the sole responsibility of our HSEP cloud vendor(s). The HSEP coupled with the VHC business capabilities have begun the modernization of the health service landscape in Vermont and will provide a stable, scalable, architecture that will

accommodate the growth and integration of programs that to date have been separate. As depicted above, the State's Enterprise will mature and develop bringing about a greater leverage of shared components. The State will identify and expand the repertoire of common business services and therefore future implementations will utilize a larger pool of common services, simplifying future program implementation and reducing cost, time and risk.

The State has made extensive investments in technologies and services as part of the HSE. It is the State's expectation that, to the extent possible and appropriate, the vendors will leverage the investments the State has made, either through reuse of technologies already owned, or through use of Web services available in the SOA-compliant HSE Platform. The following table provides an overview of the instantiated and envisioned HSE Platform services and capabilities. As these technologies and services are further built out, they will be available for use by HSE solutions.

**Table 1 HSE Platform Services and Capabilities (Components)**

<b>Identity Management</b>	Ensure individuals are identified across the range of roles that they play and human services programs that they interact with, and have access only to information and functionality for which they are authorized
<b>Consent Management</b>	Ensure that appropriate information is shared with only individuals that are authorized and have a need for access by providing explicit authorizations.
<b>Portal</b>	Provide a consistent user interface and access to information and functionality
<b>Enterprise Information Exchange</b>	Also referred to as a gateway, or service bus, which provides a standards based mechanism for integrating with and sharing information among the full range of human services and administrative applications
<b>Master Data Management</b>	Includes Master Person Index, and Master Provider Index to ensure a common view and single version of the "truth" across Vermont's HHS programs
<b>Rules Engine</b>	Define and manage the business rules that will drive eligibility assessments across human services programs
<b>Eligibility Automation Foundation</b>	Provide HSE Platform shared functionality for eligibility screening, application and determinations services for Vermont HHS programs

<b>Content Management</b>	Allow management of and access to a wide range of information and media
<b>Analytics and Business Intelligence Tools and Repositories</b>	Create reports and dashboards to shed light on and manage current operations, and to develop analytical and predictive analyses for future planning and policy development
<b>Collaboration Capabilities</b>	These capabilities are part of the UCM component. These capabilities include: Service Coordination (Secure Messaging and Shared Case Notes), Client and Provider Look-Up and Query, Referral Management (Create Referral and Manage Referral), and Alerts and Notifications
<b>Service-Oriented Architecture (SOA)</b>	Architected services that are composed of discrete software agents that are loosely coupled to other enterprise components. These services are re-usable for the construction of additional applications.
<b>Universal Customer Management (UCM)</b>	Ensure individual (member) data is managed holistically. This is generally serviced by CRM applications that touch multiple areas of a customer (member) activity. Services to be used include CRM 2.0 capabilities thus offering bi-directional communications and exchanges. This is backbone of any Care management system.
<b>Enterprise Content Management (ECM) and Customer Communication Management</b>	Allow for the management of structured and un-structured data across the enterprise. The customer communication management part refers to notifications constructed by the business to formally communicate with members by way of the enterprise.
<b>Business Process Management (BPM)</b>	A SOA supported system that generates, stores, and re-uses business processes required to perform the necessary business requirements of the target solution.

## Current Technical Environment

The State has adopted a high-level architecture that provides a contemporary and robust approach to meeting Vermont's HSE vision.

The State currently owns licenses for many of the core technologies that are strategic to the HSE. A list of these licenses is located in the Procurement Library. Vendors are encouraged to utilize these technologies in their solution designs.

The HSEP project is well underway and the milestones achieved to date include:

1. HSEP Hosting Provider (CGI Federal : Phoenix, CGI Federal : SunGard (Philadelphia) Disaster Recovery)
  - Environments contain all application capabilities listed in item #2 below.
  - Development, Testing, Training, Staging (mirror Production), Production and Disaster Recovery Environments (mirrored from Production)
2. State of Vermont HSEP Licensed Products

The SoV licensed the following products on an enterprise/unlimited basis	
Pillar	Products
<b>Database Products</b>	Oracle Database Enterprise Edition
	Real Application Clusters
	Partitioning
	Advanced Security
	Database Vault
	Oracle Advanced Compression
	Oracle Active Data Guard
	Diagnostics Pack
	Tuning Pack
	Change Management Pack
	Provisioning and Patch Automation Pack for Database
	Configuration Management Pack for Oracle Database
	Oracle Datamasking Pack
	Business Intelligence Publisher
<b>Case Management Products</b>	Siebel Public Sector CRM, Siebel Base CRM, Siebel Public Sector Partner Portal, Siebel Public Sector eService, Siebel Partner Manager,
<b>Rule Engine Products</b>	Oracle Policy Automation, Oracle Policy Modeling, Oracle Policy Automation Connectors for Siebel

The SoV licensed the following products on an enterprise/unlimited basis	
Pillar	Products
<b>Reporting and Business Intelligence</b>	Oracle Business Intelligence Suite Enterprise Edition Plus
	Oracle Business Intelligence Management Pack:
	Informatica PowerCenter and Power Connect Adapters
	Partner Analytics Fusion Edition
	Contact Center Telephony Analytics Fusion Edition
	Service Analytics Fusion Edition
	Case Management Analytics Fusion Edition
	Oracle Data Integrator
	Oracle BI Publisher
	Identity Analytics
<b>Identity and Access Management</b>	Identity and Access Management Suite Plus
	Oracle Virtual Directory
	Identity Manager
	Oracle Internet Directory
	Oracle Identity Manager
	Oracle Access Manager
	Oracle Internet Directory
	Oracle Adaptive Access Manager
	Identity Manager Connector - Database Applications Table
	Identify Manager Connector - Database User Management
	Identify Manager Connector - Microsoft Active Directory
	Identify Manager Connector - Microsoft Exchange
	Identify Manager Connector - PeopleSoft Enterprise Applications
	Identify Manager Connector - Database Microsoft Windows
	Identify Manager Connector - UNIX
	Identify Manager Connector - RSA Authentication Manager
	Identify Manager Connector - Siebel Enterprise Applications
	Identify Manager Connector - IBM RACF
	Management Pack Plus for Identity Management
<b>Portal Products</b>	Liferay Enterprise (One gate)

The SoV licensed the following products on an enterprise/unlimited basis	
Pillar	Products
	Management Pack for WebCenter Suite
	WebCenter Suite (does not include Content Management)
	WebCenter Suite Plus upgrade
<b>Enterprise Content Management Products</b>	Oracle Web Center Capture v 10.1.3.5.1 aka 10gR3 Oracle Recognition and Content v11.1.1.7
	Thunderhead Now v5.1 WCP/WLS (notices)
<b>Service Orientation Platform Products / BPM</b>	WebLogic Suite
	SOA Management Pack Enterprise Edition
	WebLogic Server Management Pack Enterprise Edition
	SOA Suite for Oracle Middleware
	Includes Oracle BPEL
	Includes Oracle Mediator
	Includes Oracle Rules
	Includes Oracle Human Workflow
	Includes Oracle Service Bus
	Includes Oracles Business Activity Monitoring
	Unified Business Process Management Suite
	Enterprise Repository
	Service Registry
	Healthcare Adaptor
	Application Integration Architecture
	MDM-CRM Integration PIP
	Oracle Application Management Suite for Siebel
<b>Master Data Management and Data Quality Products</b>	Oracle Customer Hub Data Steward -
	Oracle Customer Hub B2B
	Oracle Customer Hub B2C
	Oracle Activity Hub B2B for Oracle Customer Hub B2B
	Oracle Activity Hub B2C for Oracle Customer Hub B2C
	Oracle Customer Master Data Management Integration Base Pack

The SoV licensed the following products on an enterprise/unlimited basis	
Pillar	Products
	Oracle Data Quality Matching Server - limited to 4 Processors
	Oracle Data Quality Address Validation Server - limited to 4 Processors –
	Oracle Data Quality Parsing and Standardization Server (Informatica) - limited to 4 Processors. OEDQ is implemented instead of Informatica though it is licensed for any data quality
	Oracle Data Quality Profiling Server (Informatica) - limited to 4 Processors. OEDQ is implemented instead of Informatica though it is licensed for any data quality
Misc.....	Oracle Governance, Risk, and Compliance Manager
	UPK
	Secure Enterprise Search

By utilizing and extending the strategic HSE Platform, as deployed for Vermont Health Connect (VHC), other initiatives/projects can remain true to Vermont and CMS' objectives for modularity and reuse. The HSE Platform provides the three key elements of this foundation:

1. The computing platform itself, which for Vermont is a deployment of primarily Oracle's software stack, in a cloud sourced, Cloud-based model. This includes infrastructure, security and maintenance and operations for software maintenance, database and middleware management as well as development management for VHC.
2. A collection of reusable business and technical capabilities that allow business processes to utilize and in many cases offload many overhead or common responsibilities, such as Access and Identity Management, thus simplifying and shrinking the overall solution.
3. A collection of reusable business services that allow business functions to focus solely on their core capabilities, while ensuring that all business services behave in a standard manner for critical enablers such as Case Management.

Thus a major focus for this project is to design and implement the 'future state' business operational models utilizing these reusable enabling services. The result will be a more integrated set of health care and human service programs available to Vermonters, operating and supported in simpler, more standard fashions. This will allow the State to achieve its objectives for person-centric services, increased self-service, simplified State workload, and increased capacity for front-line service delivery to Vermonters.